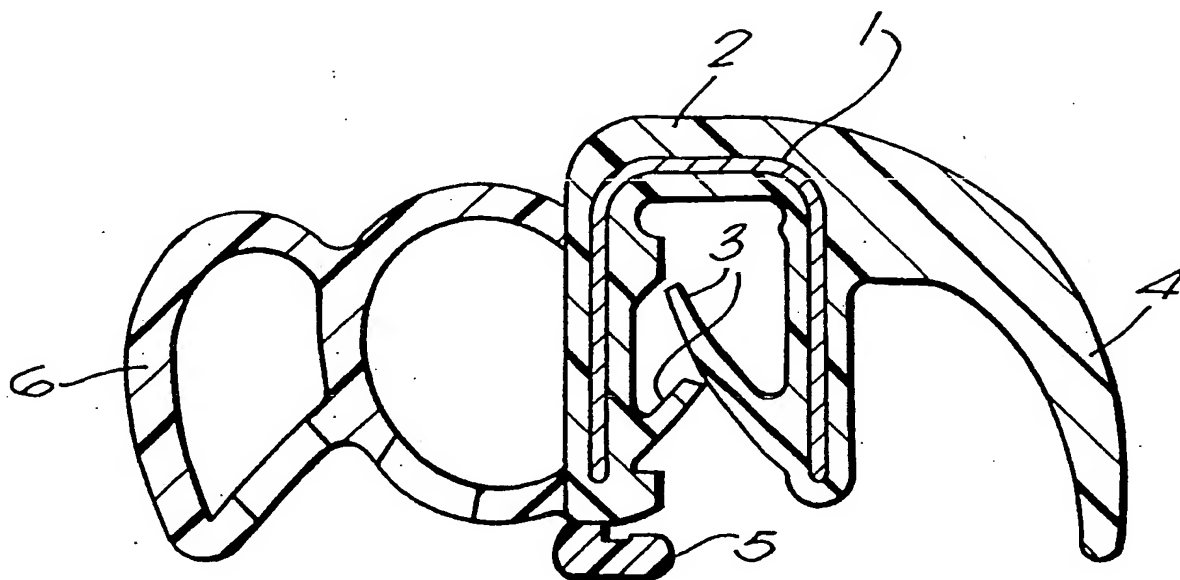


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B60J 10/00, 10/04</b>	<b>A1</b>	(11) International Publication Number: <b>WO 98/21061</b> (43) International Publication Date: <b>22 May 1998 (22.05.98)</b>
<p>(21) International Application Number: <b>PCT/GB97/03120</b></p> <p>(22) International Filing Date: <b>12 November 1997 (12.11.97)</b></p> <p>(30) Priority Data: <b>9623536.1</b> <b>12 November 1996 (12.11.96)</b> <b>GB</b></p> <p>(71) Applicant (<i>for all designated States except US</i>): <b>BTR SEALING SYSTEMS (UK) LIMITED [GB/GB]; Beveridge Lane, Bardon Hill, Coalville, Leicester LE67 1TA (GB).</b></p> <p>(72) Inventors; and (75) Inventors/Applicants (<i>for US only</i>): <b>FAIRBURN, David, Geoffrey [GB/GB]; 37 South Street, Barrow Upon Soar, Loughborough, Leicestershire LE 12 8LY (GB). FOY, Martin, J. [GB/GB]; 6 Cambrian Way, Ashby de la Zouch, Leicestershire LE65 1DX (GB). NAVI, Brian [GB/GB]; 76 Fieldway, Jarrow, Tyne &amp; Wear NE32 4QQ (GB). WILLS, Steven, K. [GB/GB]; 10 Whitelake Close, Melton Mowbray, Leicestershire LE13 0EQ (GB).</b></p> <p>(74) Agent: <b>CARPMAEL, John, William, Maurice; Carpmals &amp; Ransford, 43 Bloomsbury Square, London WC1A 2RA (GB).</b></p>	<p>(81) Designated States: <b>AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</b></p> <p><b>Published</b> <i>With international search report.</i></p>	

(54) Title: **COMPILATION EDGE TRIM OR SEAL**

## (57) Abstract

A compilation edge trim or seal is disclosed. The edge trim is formed at least partly of rigid or semi-rigid polymeric material in a first disposition in which it can be applied to a flange, e.g. opened out, in two pieces or too large to fit the flange, and after application to the flange is converted to a second, flange gripping disposition, e.g. by hinging about a hinge line from the opened out to a clamping disposition, or by the two pieces being combined in such a way as to grip the flange, or by shrinking from its too large disposition to grip the flange. The hinged construction can have its hinge in several different locations. The compilation seal is formed in two parts, one incorporating a C-channel and the other incorporating a T-rib, with one of the parts being a resiliently deformable sealing part. The two parts can be interengaged by locating the T-rib in the C-channel. By forming the edge trim or seal in the above ways, various parts are easily recyclable.

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COMPILATION EDGE TRIM OR SEAL

This invention relates to a compilation edge trim or seal designed for fitting to a flange around an aperture or to a  
5 closure member for an aperture such as found in a motor vehicle. It will be appreciated however, that the edge trim or seal could be used for other purposes.

The invention also relates to various methods of fitting  
10 edge trims or seals to flanges or generally.

Traditionally, edge trims and seals comprise an extrusion of U-shaped cross-section formed of one or more polymeric materials and incorporating therein a carrier to impart  
15 rigidity and a certain amount of resilience to the edge trim or seal. The carrier is normally formed of metal, i.e. of springy sheet metal or of a spring wire bent into a serpentine shape and reinforced with textile threads. Such edge trims or seals are composite in nature, making their  
20 recycling, fine tuning and fitting difficult. This is especially the case with modern day composite seals incorporating soft retaining or gripper fins, bulbous seals, internal flip seals, coloured portions to match trim variations, etc. Traditionally, such edge trims and seals  
25 are fitted to the flange either using a semi-automatic roll forming technique which causes the edge trim portion of the product to be deformed from a slightly opened out state into a flange gripping state on the flange or alternatively, they are fitted using a hand or pneumatic hammer.

30 The present invention seeks to provide a combination edge trim or seal which overcomes the problems associated with known edge trims or seals and in particular, which is easy to fit to a flange and can easily be recycled.

35 According to a first aspect of the present invention, we provide an edge trim for application to a flange such as that found around a door opening in a motor vehicle or

- around a panel for closing an opening in a motor vehicle, wherein the edge trim is formed at least predominantly of a rigid or semi-rigid polymeric material and is convertible from a first state in which it will not grip a flange to which it is to be applied but in which it can easily be applied to the said flange and a second condition in which it is of generally U-shaped cross-section and in which it firmly grips the flange to which it has been applied.
- 10 The edge trim according to this first aspect of the invention may take many different forms. For example, in one construction it could be formed of two or more parts which are assembled together after the parts have been applied or while the parts are being applied to the flange and which are then moved into locking, flange gripping engagement with each other. For example, the edge trim may be divided into two substantially equally sized parts with interdigitating portions which lock together during assembly of the two parts. In an alternative embodiment, the two parts may be partially assembled prior to fitting of the edge trim onto the flange, each part being of generally U-shaped cross-section with a first part being rigid or semi-rigid and the second part being in the form of a resiliently deformable insert sized to fit within the arms of the U-shaped rigid or semi-rigid part and comprising a resiliently deformable gripper portion which has portions thereof which interlock with parts of the rigid or semirigid member. In this construction, the gripper portion is loosely inserted between the free-end portions of the arms of the rigid or semi-rigid part, the gripper portion is then fitted over the flange and the rigid or semi-rigid member is then pushed onto the flange, thus causing the two parts to be assembled together and the gripping portion to be deformed into gripping engagement with the flange and to be moved into locking engagement with the rigid or semi-rigid part.

In an alternative construction of edge trim according to the first aspect of the invention, the edge trim may be formed

of two parts hingedly connected to each other whereby when the two parts are in a first disposition relative to one another, the edge trim is easily applied to the flange but when they are hinged relative to one another so as to take up a second disposition relative to one another, they define a U-shape in cross-section, such that the edge trim can grip the flange. In one embodiment of this construction, the two parts are hingedly connected to each other about a hinge line disposed at a junction between one arm of the U-shaped edge trim and a base portion thereof. Preferably in this construction, when the two parts are hinged relative to each other to take up their second disposition, there is a snap-fit or snap-lock to lock the two parts in their second disposition or alternatively, alternative means may be used to hold the two parts in their second disposition.

In a first embodiment of a modified version of this hinged construction, the two parts of the edge trim may be hingedly connected to each other about a hinge line extending along the tip of one of the arms defining the edge trim's U-shape and one part of the edge trim may be comprised of a channel section member of the same general overall dimensions as the edge trim and defined by a first arm, a first base portion and a second arm portion having an elbow joint therein and the second part is comprised of a second arm portion hingedly connected about said hinge line to the second arm portion and a second base portion and wherein the second arm portion and the second base portion of the second part are arranged to be moved respectively, into over lying engagement with the second arm portion and first base portion of the first part when the two parts are moved to their second disposition after the second arm portion has been deformed by bending about its elbow joint. Preferably in this construction, latching means are provided on the second part which assist in locking the second part to the first part when the two parts have been moved to their second disposition relative to one another with the edge trim then able to grip the flange. In a second embodiment,

the elbow joint could be omitted. In a third embodiment, an elbow joint could be formed in each arm of the U, and both arms and the base portion could be formed of two halves, namely an inner portion and an outer portion. It is  
5 envisaged that in each of these embodiments, the edge trim could have internal gripper fins, or alternatively, the gripper fins could be formed separated on an insertable gripper portion, largely as described above.

10 In another embodiment of this construction, the edge trim parts are hingedly connected to each other about a hinge line extending along a base member forming the base of the U of the U-shaped edge trim and when the two parts are moved  
15 from their first disposition relative to one another, in which the parts are easily applicable to the flange to their second disposition in which they are in flange gripping engagement with the flange, interengageable locking portions formed in the base portion of each part move into locking engagement with each other to hold the parts in their second  
20 disposition.

In a yet further construction of the first aspect of the invention, the two parts of the edge trim may be joined together by a shrinkable portion located in the base portion  
25 of the U-shaped edge trim and the construction of the edge trim is such that when the two parts are in the first disposition relative to one another, the two arms of the U are further spaced apart than when in their second disposition relative to one another, shrinkage of the  
30 shrinkable base portion being caused to occur to move the two arms towards each other into flange gripping engagement with the flange when the edge trim in its first disposition has been applied to the flange. Such shrinkage may be caused by the application of heat, radiation, chemicals or  
35 in any other manner, e.g. by returning to its natural state having been stretched to fit over the flange.

In each of the above constructions, the edge trim may be

provided with gripper fins on interior faces of its two arms or with other means for gripping the flange to which it is applied. Each of the gripper fins (sometimes called sealing lips) may be made of similar or of different material and those on one arm of the U may be equal in number to or different in number from those on the other arm of the U and may be of the same shape as, or a different shape from, either each other or the fins (or lips) on the other arm of the U and likewise may be of the same or different hardness.

10

Likewise, the edge trims according to the various different embodiments of the invention described above may be provided with one or more seals on their exterior face for sealing engagement with another part of the vehicle or other object to which they have been applied.

15

According to a second aspect of the present invention, we provide a compilation seal comprising at least two separable parts provided by a first anchoring part and a second resiliently deformable sealing part for attachment to the first part, there being a generally T-shaped rib formed on one of the parts which co-operates with a matching C-shaped channel on the other part, by means of which the two parts are joined together, the channel and rib each being integrally formed with its relevant part.

25

In one embodiment of the second aspect of the invention, the first part is for application to a flange around an opening on a motor vehicle or other member or around a closure member for an opening in a motor vehicle or other member, or for application to a flange elsewhere, the first part being a flange gripping portion formed of rigid or semi-rigid polymeric material and the channel and protrusion is each integrally extruded with its relevant part.

35

The flange gripping part may be push-fitted onto, or be deformed into gripping engagement with a flange and may be provided with integral gripper fins or sealing lips on one

or both arms thereof which may be of the same, similar or different hardness, shape and number and/or it may be formed with one or more integral seals of a primary or secondary nature. The second sealing part may be formed with one or  
5 more secondary seals which may be of the same or different material.

In a second embodiment of the second aspect of the present invention, the first anchoring part is a trim panel for a  
10 motor vehicle, the trim panel having an edge region thereof to which the resiliently deformable sealing part is removably connected, with one of the trim panel and seal being provided with the channel (or groove) groove or the  
15 rib (or projection) thereon which cooperates with the mating rib (or projection) or channel (or groove) formed in the other of the trim panel and seal. This allows a seal to be provided on the body of the vehicle where otherwise one may not be provided. Normally, the groove or projection formed on the trim panel is formed on a portion thereof which  
20 covers a flange on the body of the vehicle e.g. around at least a part of a door opening over which flange the edge region of the trim panel extends. With this construction, it is possible cost effectively to fit a secondary seal (to supplement a primary seal provided on the closure member or  
25 the aperture) around a portion of which the trim panel is fitted. If desired, the trim panel may be fitted with a cloth or other covering material to overlies the seal attachable to the trim panel.

30 In each construction of the present invention, the or each sealing part may be made of the same or different coloured material as the first part and different component portions of each part may likewise be made of the same or different coloured materials.

35

In both the first and second aspects of the invention where a sealing part is provided, the sealing part may be formed of a sponge or sponge-like material. Likewise, wherever a



sealing part or seal is provided, the seal can be of one continuous profile or of a variable extrusion profile where the shape is varied along the length to correspond directly to a required gap to be sealed or may be of variable profile  
5 produced by transition moulding different profile extrusions put together.

In an alternative embodiment of the second aspect of the invention, the edge trim may be provided with trim part and  
10 a flange gripping part formed separately thereof and insertable therein either during or prior to application of the edge trim to a flange. This insertable part may be provided with one or more externally projecting secondary seals located adjacent a free-end portion of an arm thereof.

15 If desired, at least a section along the length of the first portion or sealing portion is of variable length so as to accommodate variations in the apertures' projected length or in the projected length of the closure member. The variable  
20 length portion may be provided by a moulded-in concertina portion.

It is preferred that the carrier/edge trim is formed of a rigid or semi-rigid plastics material or thermoplastic  
25 elastomer which can be arched and bent into the required shape to fit into or around the aperture or onto or around a closure member for the aperture to be sealed. There are many acceptable ways of effecting such shaping, including heating and manual manipulation, computer numerical control  
30 manipulation or moulding.

The two aspects of the present invention are now described by way of example by reference to the accompanying, partly schematic drawings in which:-

35

FIGURE 1 is a section through a traditional design of composite edge trim with integral seal,

FIGURES 2a-2c show three views of a first embodiment of a first, two-part construction of edge trim according to the first aspect of the present invention,

- 5 FIGURES 3a-3c show three views of an alternative embodiment of the two-part construction, with seals attached thereto,

FIGURES 4a and 4b show two views of a first embodiment of a second hinged construction of the first aspect of the  
10 invention,

FIGURES 5a and 5b show a second embodiment of the second hinged construction,

- 15 FIGURES 6a and 6b show two variations of a third embodiment of the hinged construction,

FIGURES 7a and 7b show a first embodiment of a modified version of the hinged construction of the first aspect of  
20 the invention,

FIGURES 8a-8c show three views of a second embodiment of the modified version of the hinged construction of the first aspect of the present invention,  
25

FIGURES 9a and 9b show two views of a third embodiment of the modified version of the hinged construction of the first aspect of the present invention,

- 30 FIGURES 10a and 10b show two views of a shrinkable construction of the first aspect of the present invention,

FIGURE 11 is a composite view showing, in section, a first embodiment of a compilation edge trim and seal, with a two  
35 part edge trim, and two different seals, showing various parts combined and separated from one another, according to a second aspect of the invention,

FIGURE 12 is a view similar to Figure 11 showing a modification to the first embodiment of a compilation edge trim and seal according to the second aspect of the present invention,

5

FIGURE 13 is a section showing another modification to the first embodiment of compilation edge trim and seal according to the second aspect of the invention,

- 10 FIGURES 14a and 14b are perspective scrap views showing how an edge trim according to the present invention can be reduced in length,

- FIGURE 15 shows an alternative embodiment to that of FIGURES  
15 14a and 14b,

FIGURE 16 shows schematically how the embodiments of figures 14a, 14b and 15 are used on a motor vehicle,

- 20 FIGURE 17 is a section showing a second embodiment of the second aspect of the present invention, and

FIGURE 17a shows a modification of the construction shown in Figure 17.

25

- Referring to Figure 1, a known composite extruded edge trim which is extruded in one piece is illustrated, which comprises a U-shaped metallic carrier 1 incorporated within a polymeric edge trim 2, provided with gripper fins 3,  
30 (which need not be of the same properties as those of the trim 2), a flip seal 4, a secondary seal 5 and a main, bulbous seal 6.

- In Figures 2a-2c of the drawings, a first embodiment of two-  
35 part edge trim according to the invention is illustrated, Figure 2a showing the two parts completely separated, Figure 2b showing the two-parts partially assembled in the state in which they might be applied to a flange (not shown) and

Figure 2c showing the edge trim after full assembly and how the two parts would be arranged when the edge trim is fitted to the flange (except that the gripper fins would be more deformed). The edge trim has a generally U-shaped cross-section with a first wall portion 1 forming one arm of the U, a second wall portion 3 forming an opposite arm of the U and the base of the U 5 being formed by two interdigitatable base portions 7 and 9 joined respectively to the wall portions 3 and 1. The wall portion 3 has three gripper fins 11 of generally known construction extending from an inner face thereof, whereas the wall portion 1 has one large gripper fin 13 extending from inner face thereof. The gripper fins 11 and 13 can be of any desired shape and hardness and the numbers thereof may be different from the numbers illustrated. Normally, they would be extruded in a single extrusion operation with their respective wall portions 3 and 1, e.g. in a dual durometer extrusion process. The base portion 7 has an external finger 15 and a serrated internal finger 17 which, when the two parts are assembled together, interdigitates with fingers 19 and 21 on the base portion 9 as shown in Figures 2b, 2c. The serrations on the finger 17 cooperate with ribs and grooves formed on the facing surfaces of the fingers 19 and 21, and are such that it is easy to fit the two parts together and move them from the partially assembled configuration shown Figure 2b towards the fully assembled configuration shown in Figure 2c but is extremely difficult to separate the parts thereafter. It will thus be appreciated that this embodiment of the first aspect of the invention provides a two-part edge trim which is easily assembled, such that the two parts can easily be snapped together with a ratcheting action and into gripping engagement with a flange. This could be achieved manually, or semi- or fully automatically.

As will be apparent from the Figures 2a-2c, each of the wall portions 1 and 3 is formed with a generally C-shaped slot or groove 23,25 therein, by means of which a bulbous or flap seal may be connected to the edge trim as will later be

described herein.

Referring now to the second embodiment of the first aspect of the invention shown in Figures 3a to 3c, the edge trim  
5 shown therein has the same generally U-shaped cross-section as in the previous embodiment, with the arms of the U being defined by wall portions 31,33 and the base of the U being defined by a base portion 35. The edge trim is again formed in two parts, one part being formed by the side wall  
10 portions 31 and 33 and base portion 35 and the other part being formed by a slide-in grip fin or sealing lip portion shown generally at 37. In this embodiment, in-turned ribs 39 are provided along the free-end portions of each arm portion 31,33 and similar in-turned ribs 41 are also  
15 provided towards the base of each arm portion 31 and 33 but spaced slightly from the base portion 35.

The portion 37 may be, but is not necessarily, formed of a softer material than the remainder of the edge trim and is  
20 of generally U-shaped cross-section with two arm portions joined at one end by a base portion and with each of the arm portions being provided with gripper fins or sealing ribs 43,45 in known manner. The portion 37 is manufactured e.g. by an extrusion operation, with its two arm portions  
25 splayed outwardly somewhat relative to the base, as shown in Figure 3a, and at the junctions between the arm portions and the base, outwardly facing grooves are provided with which the ribs 39 engage when the portion 37 is assembled with the remainder of the edge trim, as shown in Figure 3c.

30

As is apparent in Figures 3a to 3c, the portion 37 is sized and shaped so as to form a sliding fit between the arm portions 31 and 33. After the two parts of the edge trim have been pre-assembled as shown in Figure 3a, the grip fin  
35 portion 37 can be positioned over a flange F to which the edge trim is to be applied, as shown in Figures 3b, with the arms of the grip fin portion 37 loosely arranged on either side of the flange F. If downward pressure is then applied

to the base portion 35 of the edge trim as represented by the arrow A in Figure 3b, the grip fin portion 37 will be caused to deform so that its two arms gradually move into gripping and sealing engagement with the flange F and at the same time, the two parts of the edge trim will move with respect to each other until they eventually take up the fully assembled flange gripping position shown in Figure 3c, in which position the ribs 39 will have moved out of the grooves in the portion 37 and instead, the ribs 41 will move into locking engagement within the said grooves.

In this construction, a flap or fin type seal 47 and a bulbous type seal 49 are shown assembled, one on either side of the edge trim. The edge trim is provided with C-shaped grooves similar to the grooves 23 and 25, into which T-shaped ribs on the seals 47 and 49 can be assembled to hold the parts together.

Figures 4a and 4b show a first embodiment of an alternative, hinged construction of edge trim according to the first aspect of the invention, with the two views illustrating how the edge trim is deformed from a position in which it is easily applied to a flange (Figure 4a) to a position in which it grips the flange after application thereto (Figure 4b). As with the previous construction, the edge trim is of generally U-shaped cross-section with one arm 1a of the U forming one side wall of the edge trim, a second arm 3a of the U forming the opposite side wall and a base portion 5a forming the base of the U. The side wall 3a is hingedly connected to the base 5a in a hinge region 7a, the precise location of which is unimportant, thus allowing the side wall 3a to be pivoted relative to the side wall 1a as illustrated in Figure 4a. Suitable interlocking latching means 8 formed, respectively, on the side wall 3a and base portion 5a in the region of the hinge area 7a, are provided, to latch the relatively moveable walls 3a and 5a together when the side wall 3a has been moved to its flange gripping position, as shown in the Figure 4b. As in the previously

described construction, the edge trim is provided with a plurality of gripper fins, the precise construction of which is unimportant, and may also be provided with C-slots as in the previously described constructions.

5

A second embodiment of hinged construction according to the invention is illustrated in Figures 5a and 5b which, like in Figures 4a and 4b, show the edge trim in a first disposition in which two parts thereof have been moved apart to allow  
10 the edge trim to be applied easily to a flange, and a second flange gripping position (Figure 5b). In this embodiment, the edge trim is again of generally U-shaped cross-section, and a hinge line 70 is provided running centrally along a base portion 71 of the edge trim, thus dividing the edge  
15 trim into two halves, each incorporating a side wall and part of the base of the edge trim. The whole of an inner wall portion 73 of the base portion 71 is provided on one part of the edge trim and this inner wall portion is generally hook-shaped as shown at 75, whereas a mating  
20 surface 77 of the other part of the edge trim is formed in a complementary recessed shape to the hook-shape portion 75, so that when the two parts of the edge trim are moved from the disposition shown in Figure 5a (in which the edge trim is easily applied to a flange) to its disposition shown in  
25 Figure 5b (its flange gripping disposition), the hook-shaped portion 75 will snap into locking engagement with the recess portion 77 on the other part of the edge trim. As in the previous embodiments, the edge trim may be provided with internal gripper fins and one or more C-slots or T-ribs for  
30 accommodating a seal or alternatively or additionally, as shown, with an integral bulbous seal or flap seal 79.

In the two embodiments of hinged construction shown in Figures 6a and 6b, the edge trim only differs from that of  
35 Figures 5a and 5b at the hinge location 7b, where a modified hinge and latch arrangement is provided.

Referring now to the modified version of the hinged

construction shown in Figures 7a and 7b, the edge trim is again generally of U-shaped cross-section, and has a first arm 61 of normal thickness but the second arm of the U, shown generally at 63 and the base of the U shown generally at 65, are each split longitudinally along their total length so as to divide each portion into two substantially equal thickness portions 63a, 63b and 65a, 65b. The two outer layer portions 65a, 63b of the edge trim are hingedly connected to the inner layer portions 63b, 65b about a hinge line 67 located at the tip of the arm 63, and in order to allow the outer layer portions easily to be separated from the inner layer portions, an elbow joint 69 is formed in the inner layer 63b of the arm 63. Of course, the hinge line 67 and the elbow joint 69 will extend lengthwise throughout the total length of the edge trim. Suitable interlocking grooves 66 and ribs 68 are provided in the facing surfaces of the portions 63a and 63b (they may be provided anywhere therein or even in the surfaces of the portion 65a and 65b). Furthermore, and at its free end edge, the outer base portion 65a is provided with a hook-over portion 70 which embraces that region of the arm 61a at the base of the U where it joins the base 65 of the U. As can be seen from Figures 7a and 7b, to apply the edge trim to a flange, the outer layer portions 63a and 65b are separated from the inner layer portions by causing pivoting to occur about the hinge line 67 and the elbow joint 69 as shown in Figure 7a. The edge trim can then easily be applied to the flange and it is then deformed and snapped with a type of over centre latching action into its flange gripping disposition as shown in Figure 7b. As with the previous constructions, suitable gripper fins or sealing lips may be provided on the inner faces of the arms 61 and 63 of the edge trim and the edge trim may be provided with one or more C-grooves (or T-ribs) by means of which one or more seals may be attached thereto.

Figures 8a-8c show a second embodiment of the modified version of the hinged construction, i.e. a modification of



the Figure 7a, 7b construction, the modifications including the lack of an elbow joint, the introduction of a slide in gripper fin part 62 and a modified latch portion 70a.

5 In Figures 9a and 9b, a third embodiment of the modified version of the hinged construction is shown, wherein the arm 61a is replaced by a two layer arm made up of outer arm portion 61b and inner arm portion 61c, pivotally connected together at their free ends, at 67b, with an elbow joint 69b  
10 being provided in arm portion 61c. Thus, the whole edge trim is split centrally, and instead of a hook-over portion 70, outer base portion 65b is attached to outer arm portion 61b at 70 b. Locking latches 66a, 68a are also provided. Figure 9a shows the edge trim in a first disposition, in  
15 which it can easily be located over a flange gripping portion, and also applied to a flange, whereas Figure 9b shows the edge trim in its second flange gripping disposition.

20 Figures 10a and 10b show a yet further, shrinkable construction of the first aspect of the invention, in which the edge trim is again displaceable from a first flange applying disposition shown in Figure 10a to a second flange gripping disposition shown in Figure 10b. As in the  
25 previous embodiment, the edge trim is of a generally U-shaped cross-section with side-walls of the same general construction as in some of the previously described constructions, but a base portion 81 thereof is shrinkable to reduce the spacing between the two side wall portions 83  
30 and 85 of the edge trim. The base portion 81 may be of any one of several different compositions which are such that, when these compositions are treated e.g. with heat, a chemical spray, radiation or some other form of treatment, the composition will shrink, thus causing the side wall  
35 portions 83 and 85 of the edge trim to move towards each other into flange gripping engagement with the flange, as shown in Figure 10b. The edge trim could be extruded in a shrunk state such that it must stretch to fit over the

flange and then returns to apply gripping pressure.

Referring now to Figures 11-13, three variations of a first embodiment of a second aspect of the present invention are  
5 illustrated, in which a basic generally U-shaped rigid or semi-rigid extruded edge trim is formed in one part and wherein extruded seals, which may be of any construction but should be of a resiliently deformable nature, are combined with the edge trim in a separate compilation operation.

10

In the variation shown in the different views of Figure 11, the edge trim is of the general construction shown in Figures 3a to 3c with a first semi-rigid or rigid portion 30 and a second resiliently deformable flange gripping portion  
15 37 (but the two parts could be formed as one piece). The first arm 31 of the portion 30 has a C-shaped slot 23 formed therein whereas an opposite second arm 33 thereof has a second C-shaped slot 25 formed therein. A resiliently deformable flap seal 91 has a T-section rib 93 formed  
20 thereon, the dimensions of which are designed to form a sliding or mating fit within the C-shaped slot 23 so that the seal 91 can be assembled with the edge trim 30 by sliding, snap-in, adhesive bonding or in any other acceptable manner.

25

The second arm (33) of the edge trim is designed to have a bulbous seal or sealing tube (95) attached thereto by means of a T-shaped rib (97) projecting from a face thereof which is designed and shaped to mate with or form a sliding fit  
30 within the C-shaped groove (25). As with the flap seal (91) this may be slid, snapped in or snapped over or adhesively secured to the arm (33) of the edge trim.

In Figure 12, a modified edge trim is illustrated which is  
35 provided with an integral flap seal (79) and an integral gripper fin (13), instead of the attachable flap seal 91 and the insertable flange gripping portion 37. With this edge trim, its arm (33a), instead of having a C-shaped groove 25,

is provided with a protruding T-shaped rib (99) designed to co-operate with a C-shaped groove (101) formed in a modified bulbous seal (95a). As with the previous construction, the rib (99) and groove (101) are designed for co-operating sliding or mating engagement with each other so that the two parts, namely the edge trim and seal, can easily be combined.

In Figure 13 a yet further modification is disclosed wherein, instead of there being an integral flap seal (79) on the edge trim itself has an attachable flap seal 79a. A bulbous seal (95b) somewhat similar to the bulbous seal (95) is attached to the edge trim, and this bulbous seal has integral with the flap seal (79a). The seal (95b/79a) is attached to the edge trim by means of a T-shaped rib (97) engaging in a C-shaped slot, but equally easily, the T-shaped rib and C-shaped slot could be reversed.

The important feature of the second aspect of the invention is that, with the exception of the flap seal 79, the seals are manufactured in a separate extrusion operation from the edge trims and are subsequently combined. This results in a continuous visual aspect of the edge trim but would allow variable shapes to be obtained around the periphery of an opening or closure member for an opening, shaped by means of continuous variable extrusion or by joining discrete profiles e.g. by moulding the profiles separately and then joining them together.

Figures 14a and 14b show an edge trim of the same general construction as that illustrated in Figure 11, except that the edge trim has a concertina or resiliently deformable portion 113 or several such portions shown therein. In Figure 15, a compilation edge trim and seal construction similar to that of Figure 12 is shown, but the semi-rigid or rigid edge trim portion incorporates along its length one or more concertina portions 113a. In both constructions, the portions 113, 113a allow what is otherwise a rigid or semi-

rigid member to stretch or be compressed or bend along its length, thus allowing the edge trim (and seal if provided) to be deformed to follow changes in direction of a flange to which it is to be fitted and also to allow the edge trim  
5 (and seal) to accommodate variations in the size of an aperture (or a closure for an aperture) around which the flange runs, so that it is no longer necessary to cut and form the edge trim (and seal) to a particular or exact length to fit the aperture or closure member. This is more  
10 fully illustrated in Figure 16 which shows a made-up edge trim and combination seal moulded or otherwise joined together at 111 and incorporating three concertina portions 113a therein. If the made up edge trim and seal is slightly  
15 too small for the aperture, then it can be stretched by stretching concertina portions 113a; likewise if it is slightly too large, it can be compressed by compression of the concertina portions 113a. Furthermore, of course, concertina portions could be provided where the shape of the flange changes direction drastically to allow the edge trim  
20 easily to be fitted to the flange at such locations.

A second embodiment of the second aspect of the present invention is illustrated in Figures 17 and 17a. In these figures, an edge region of a vehicle interior trim panel 121  
25 is shown at 123, this edge region 123 terminating at a door or other opening, and perhaps overlying a flange such as that found in an aperture in a motor vehicle, so as to improve the appearance of the vehicle. Normally of course, the aperture would be closed by a closure member also  
30 provided with a flange to which a seal would be fitted, so that when the closure member is closed, the seal will abut the edge portion of the trim panel so as to form a fluid tight seal therewith. According to this embodiment of the invention, the edge portion 123 of the trim panel is  
35 provided with a groove 125 of generally C-shaped cross-section with which a T-shaped rib 127 on a bulbous or other construction of seal 129 can engage. Alternatively, the seal 129 could be provided with a C-shaped groove and a T-

shaped rib could be provided on the edge portion 123 of the trim panel. These allow constructions either a primary seal or a secondary seal to be fitted to the trim panel 121, thus improving the seal between the aperture and closure member therefor. In the modified construction shown in Figure 17a, a covering cloth 131 which could of course be made of material other than cloth, overlies the seal 129, thus improving the general appearance of the vehicle.

In each of the above described constructions of the two aspects of the present invention, the rigid or semi-rigid carrier is formed of a rigid or semi-rigid plastic or thermoplastic elastomer which does not need to be reinforced with a metal carrier. The plastic or thermoplastic elastomeric can be combined with other materials, for example, it could have a thermoplastics material extrusion coated thereon and of course it could also have extruded integrally therewith, e.g. in a dual durometer extrusion process, one or more supplementary seals, gripper fins or the line. The edge trim can be arched and bent into any required shape and then formed into a loop by moulding or in any other way so as to fit into or around an aperture to be sealed. There are many acceptable ways of effecting such shaping including, heating and manual manipulation, computer numerical control manipulation, or moulding. The edge trim can be push fitted or can be locked onto the flange in a variety of other ways and it will be appreciated that the provision of gripper fins on its interior faces is optional.

The above-described constructions of edge trim and combination edge trims and seals provide products which are of lower weight than conventional edge trims and seals incorporating metal carriers. Furthermore, because they are non metallic, they do not corrode and because they are compiled in compiling operations subsequent to their manufacture by extrusion, it is possible to recycle the product because the subcomponents thereof e.g. the seals and

the edge trims, are easily separable. Furthermore, because the various subcomponents are formed separately, it is easy to modify the colour, grain and gloss of the components in line with adjacent interior and exterior surfaces, such as exterior paint work and interior trim, and this is particularly the case when the components are made of a plastics material. Furthermore, it is possible to achieve low cost fine tuning of cosmetic flips, sealing fins, gripper fins and sealing tubes because the edge trim portion is stable being rigid or semi-rigid. Also if one part is unacceptable, only that part is scrap, rather than the whole component.

The edge trims described are easy to fit because they are effectively deformed from a first disposition, and this of course means that there is substantial potential to accommodate varying flange thicknesses. Furthermore, it is very simple rapidly to develop a modified edge trim or combination edge trim and seal because the various component parts can easily be interchanged and are therefore easily fitted. Furthermore, we have found that the above constructions of edge trims and/or seals provide increased sealing against water ingress over the flange or in the opening to which they are fitted, and of course the major advantage is that there is reduced waste, especially in after sales service, because damaged component parts are easily replaced.

In each of the above aspects and embodiments of the present invention, various different combinations have been described. It should be appreciated that not only these combinations but various other combinations will be apparent to those skilled in the art. For example, some of the features of both aspects of this invention could be combined with some of the other disclosed features, thus resulting in a two-part edge trim, perhaps having the concertina feature 113 of Figure 14a which is used in combination with the interior trim construction in Figure 17, as well as with

a gripper fin/edge trim arrangement of Figures 3a to 3c.

In all of the above described embodiments having a T-shaped rib and/or a C-shaped slot, the rib or slot could have  
5 cross-sectional shapes different from those illustrated in the drawings, and hence, the terms T-shape and C-shape, wherever used herein, should be interpreted accordingly. For example, C-shaped slots with re-entrant portions are difficult to manufacture, and hence a plain slot, of  
10 generally U-shaped cross section, which is used in conjunction with a mating rib having gripping means thereon, which are easy to push into the slot, but difficult to pull out, may be used. Such ribs are sometimes described as "fir-tree" style ribs.

15

Likewise, in all the embodiments described both the edge trim and the seals, whether they be of the flap type or of the bulbous type, can have alternative constructions to those illustrated in the drawings.

20

It will thus be appreciated that the present invention, instead of providing a flexible seal of traditional construction, such as that shown in Figure 1, and which can be coiled, subsequently formed to the desired size, and then  
25 fitted provides a semi-rigid or rigid component. This cannot be coiled and is fitted by snapping or being snapped into position on the flange, after being cut to length.

It will of course be understood that the present invention  
30 has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

CLAIMS

1. An edge trim for application to a flange such as that found around a door opening in a motor vehicle or around a panel for closing an opening in a motor vehicle,  
5 characterised in that the edge trim is formed at least predominantly of a rigid or semi-rigid polymeric material and is convertible from a first condition in which it will not grip a flange to which it is to be applied but in which it can easily be applied to the said flange and a second  
10 condition in which it is of generally U-shaped cross-section and in which it firmly grips the flange to which it has been applied.
2. An edge trim according to claim 1, characterised in  
15 that it is formed of two or more parts which are assembled together after the parts have been applied or while the parts are being applied to the flange and which are then moved into locking, flange gripping engagement with each other (Figures 2a-2c, or Figures 3a-3c, or Figure 8, or  
20 Figures 9a,b, or Figure 11).
3. An edge trim according to claim 2, and which is divided into two substantially equally sized parts (1,3) with interdigitating portions (15,17,19,21) which lock  
25 together during assembly of the two parts.
4. An edge trim according to claim 2 wherein the two parts (31,37) are partially assembled prior to fitting of the edge trim onto the flange, each part being of generally  
30 U-shaped cross-section with a first part (31) being rigid or semi-rigid and the second part being in the form of a resiliently deformable insert (37) sized to fit within the arms of the U-shaped rigid or semi-rigid part and comprising a resiliently deformable gripper portion which has portions  
35 thereof which interlock with parts of the rigid or semi-rigid member.



5. An edge trim according to claim 1, comprising two parts (1a,3a or 61,63 or 61b,63a) hingedly connected to each other whereby when the two parts are in a first disposition relative to one another, the edge trim is easily applied to the flange but when they are hinged relative to one another so as to take up a second disposition relative to one another, they define a U-shape in cross-section, such that the edge trim can grip the flange.
6. An edge trim according to claim 5, wherein the two parts are hingedly connected to each other about a hinge line (7a) disposed at a junction between one arm (3a) of the U-shaped edge trim and a base portion (5a) thereof.
7. An edge trim according to claim 6, wherein when the two parts (1a,3a) are hinged relative to each other to take up their second disposition, there is a snap-fit or snap-lock (8) to lock the two parts in their second disposition.
8. An edge trim according to claim 5, wherein the two parts (61,63) of the edge trim are hingedly connected to each other about a hinge line (67) extending along the tip of one of the arms (63) defining the edge trim's U-shape and wherein one part of the edge trim is comprised of a channel section member (61,65b,63b) of the same general overall dimensions as the edge trim and defined by a first arm (61), a first base portion (65b) and a second arm portion (63b) having an elbow joint (69) therein and the second part is comprised of a second arm portion (63a) hingedly connected about said hinge line (67) to the second arm portion (63b) of the one part and a second base portion (65a) and wherein the second arm portion (63a) and the second base portion (65a) of the second part are arranged to be moved respectively, into over lying engagement with the second arm portion (63b) and first base portion (65b) of the first part when the two parts are moved to their second disposition after the second arm portion (63b) has been deformed by bending about its elbow joint.

9. An edge trim according to claim 8 wherein latching means (68,70) are provided on the second part which assist in locking the second part to the first part when the two parts have been moved to their second disposition relative to one another with the edge trim then able to grip the flange.

10. An edge trim according to claim 8, wherein the two parts of the edge trim each comprise first and second arm portions and a base portion, with an elbow joint formed in each arm portion of a first internal part, there being hinges located at the tips of each arm of the U.

11. An edge trim according to claim 5 wherein the two edge trim parts (Figure 5) are hingedly connected to each other about a hinge line (70) extending along a base member forming the base of the U of the U-shaped edge trim and when the two parts are moved from their first disposition relative to one another, in which the parts are easily applicable to the flange to their second disposition in which they are in flange gripping engagement with the flange, interengageable locking portions (75,77) formed in the base portion of each part move into locking engagement with each other to hold the parts in their second disposition.

12. An edge trim according to claim 1 wherein the two parts (83,85) of the edge trim are joined together by a shrinkable portion (81) located in the base portion of the U-shaped edge trim and the construction of the edge trim is such that when the two parts are in the first disposition relative to one another, the two arms of the U are further spaced apart than when in their second disposition relative to one another, shrinkage of the shrinkable base portion being caused to occur to move the two arms towards each other into flange gripping engagement with the flange when the edge trim in its first disposition has been applied to

the flange.

13. An edge trim according to any one of the preceding claims, and comprising gripper fins (11 or 13) on interior  
5 faces of its two arms.

14. An edge trim according to any one of the preceding claims and which is provided with one or more seals on one or more exterior faces for sealing engagement with another  
10 part of a vehicle or other object to which the edge trim is to be applied.

15. A method of fitting an edge trim to a flange on a vehicle or the like, comprising the steps of manufacturing  
15 the edge trim at least partly of a rigid or same rigid material, and in a state in which it will not grip a flange to which it is to be applied, applying the edge trim in its non gripping state to the flange, and then converting the edge trim into a second state in which it grips the flange.

20 16. A method according to claim 15, wherein a hinge is provided in the edge trim, and causing the two parts of the edge trim joined by the hinge to be moved to its second state by pivoting one part relative to the other about side  
25 hinge and latching or locking the two parts in their second flange gripping state.

17. A method according to claim 15, wherein the edge trim part is manufactured in two parts separate from one another.

30 18. A method according to claim 17 wherein the two separated parts are applied to the flange, one to either side thereof and are then moved into interlocking engagement with each other, whereupon they are in gripping engagement  
35 with the flange.

19. A method according to claim 17, when one part is a flexible generally U-shaped flange gripping part and the other part is a rigid or semi-rigid cover part, and including the step of applying the flange gripping part to the flange, and then causing the rigid or semi-rigid cover part to be applied to the flange, over the previously applied flange gripping part, to engage with the flange gripping part, and surround the flange gripping part, whereby the assembled edge trim grips the flange.

10

20. A method according to claim 15 wherein the edge trim is manufactured from two rigid or semi-rigid parts which are interconnected by a shrinkable part, and including the step of applying the edge trim to the flange and then causing shrinkage of the shrinkable part to clamp the two parts on the flange.

21. A compilation seal characterised in that the seal comprises at least two separable parts provided by a first anchoring part (30,37 or 33a) and a second resiliently deformable sealing part (95 or 91 or 79 or 95a or 95b) for attachment to the first part, there being a generally T-shaped rib (97 or 99) formed on one of the parts which cooperates with a mating C-shaped channel (25 or 101) on the other part, by means of which the two parts are joined together, the channel and rib each being integrally formed with its relevant part.

22. A compilation seal according to claim 21 wherein the first part is for application to a flange around an opening on a motor vehicle or other member or around a closure member for an opening in a motor vehicle or other member, or for application to a flange elsewhere, the first part being a flange gripping portion formed of rigid or semi-rigid polymeric material and wherein the channel and protrusion is each integrally extruded with its relevant part.

23. A compilation seal according to claim 21 wherein the flange gripping part is push-fitted onto, or is deformed into gripping engagement with, the flange.

5 24. A compilation seal according to claim 20, 22 or 23 wherein the flange gripping part is provided with integral gripper fins or sealing lips on one or both arms thereof.

25. A compilation seal according to any one of claims 21-  
10 24 wherein the flange gripping part is formed with one or more integral seals of a primary or secondary nature.

26. A compilation seal according to any one of claims 21-  
25 wherein the second sealing part is formed with one or  
15 more secondary seals.

27. A compilation seal according to claim 21 wherein the first anchoring part is a trim panel for a motor vehicle, the trim panel having an edge region thereof to which the  
20 resiliently deformable sealing part is removably connected, with one of the trim panel and seal being provided with the channel or the rib thereon which cooperates with the a mating rib or channel formed in the other of the trim panel and seal.

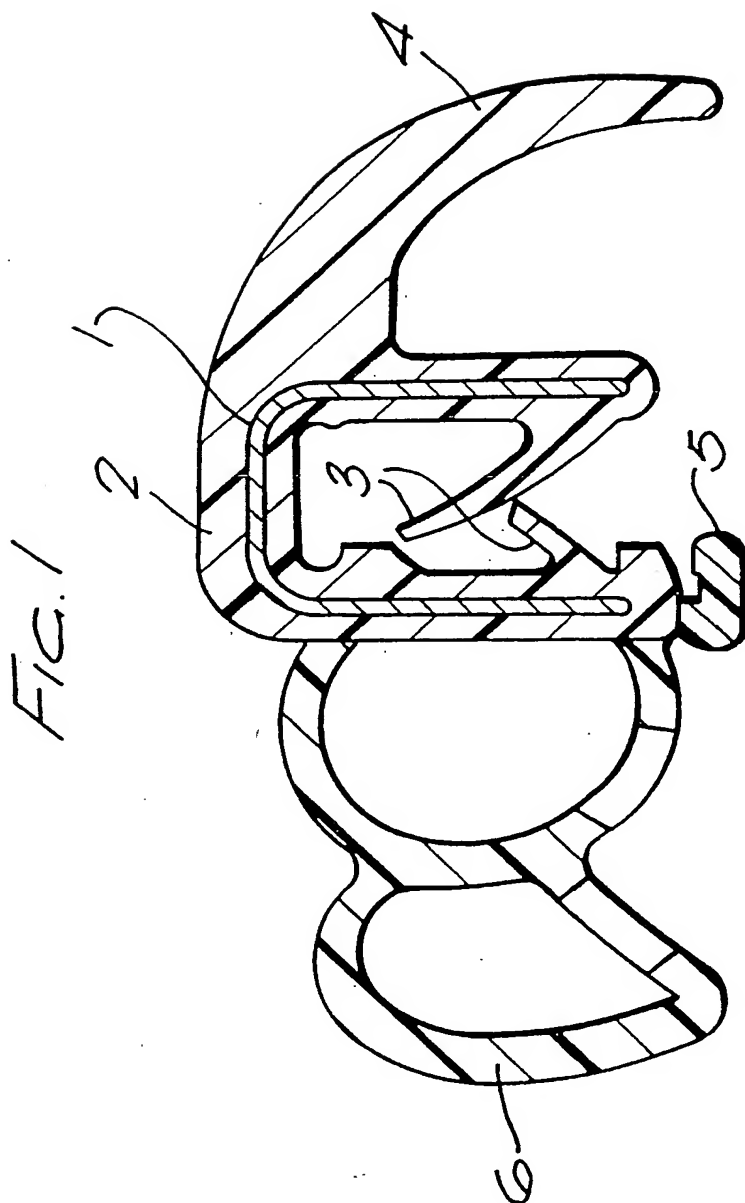
25

28. A compilation seal according to any one of the preceding claims wherein one of the parts is made of a different coloured material from the other part.

30 29. A method of fitting a seal to a flange comprising manufacturing an anchoring part, and fitting the anchoring part to the flange, and manufacturing a resiliently deformable sealing part so that it is separate from the anchoring part, said two manufacturing steps involving  
35 forming a T-shaped rib on one of the anchoring and sealing parts and forming a C-shaped groove which is complimenting to the T-shaped rib on the other of the parts, each of the rib and groove extending longitudinally of its respective

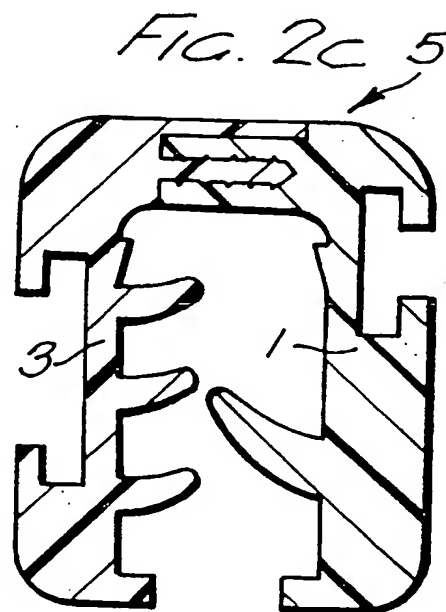
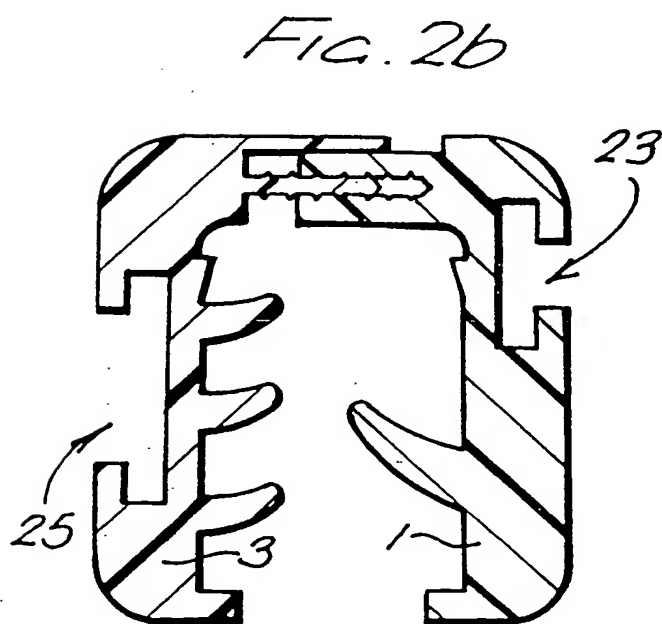
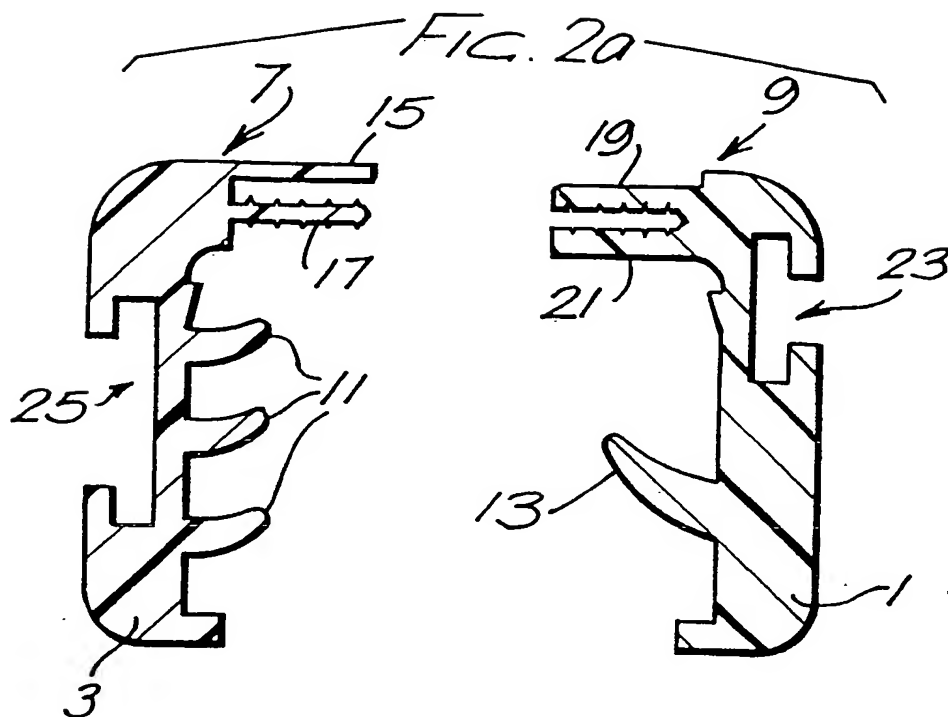
part, and subsequently joining together the two parts by engaging the rib within the groove throughout the lengths of parts.

- 5 30. An edge trim, substantially as hereinbefore described with reference to Figures 2a-2c, or Figures 3a-3c, or Figures 4a and 4b, or Figures 5a and 5b, or Figures 6a and 6b, or Figures 7a and 7b, or Figures 8a-8c, or Figures 9a and 9b, or Figures 10a and 10b of the accompanying drawings.
- 10
31. A method of fitting an edge trim to a flange, substantially as hereinbefore described with reference to any one of Figures 2a-2c, or Figures 3a-3c, or Figures 4a and 4b, or Figures 5a and 5b, or Figures 6a and 6b, or
- 15 Figures 7a and 7b, or Figures 8a-8c, or Figures 9a and 9b, or Figures 10a and 10b of the accompanying drawings
32. A compilation seal, substantially as hereinbefore described with reference to Figures 11-13, or Figures 17 and
- 20 17a of the accompanying drawings.
33. A method of fitting a seal, substantially as hereinbefore described with reference to Figures 11-13, or Figures 17 and 17a of the accompanying drawings.
- 25

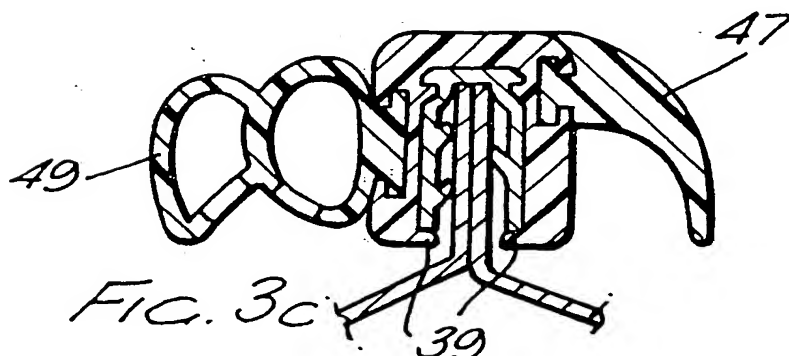
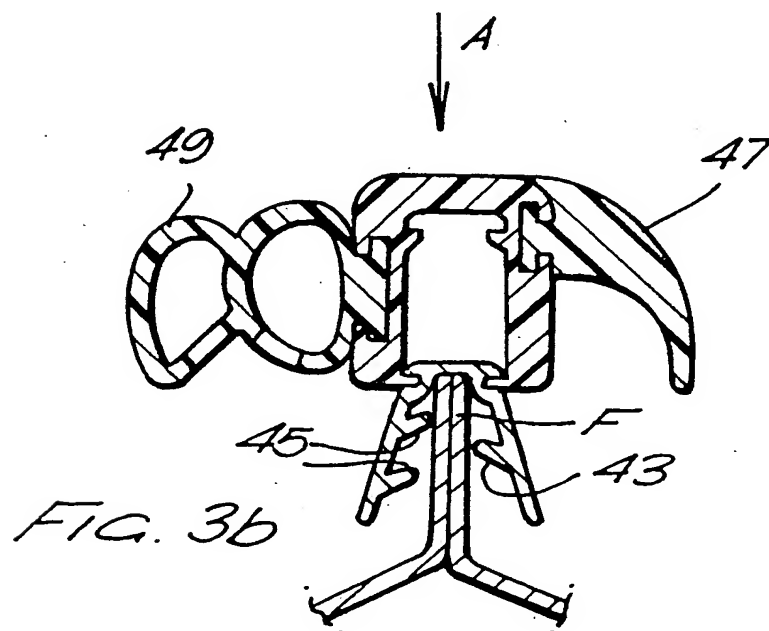
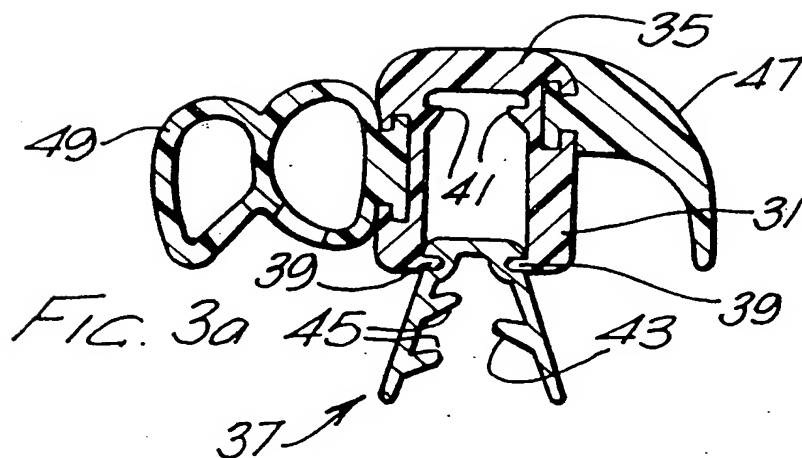


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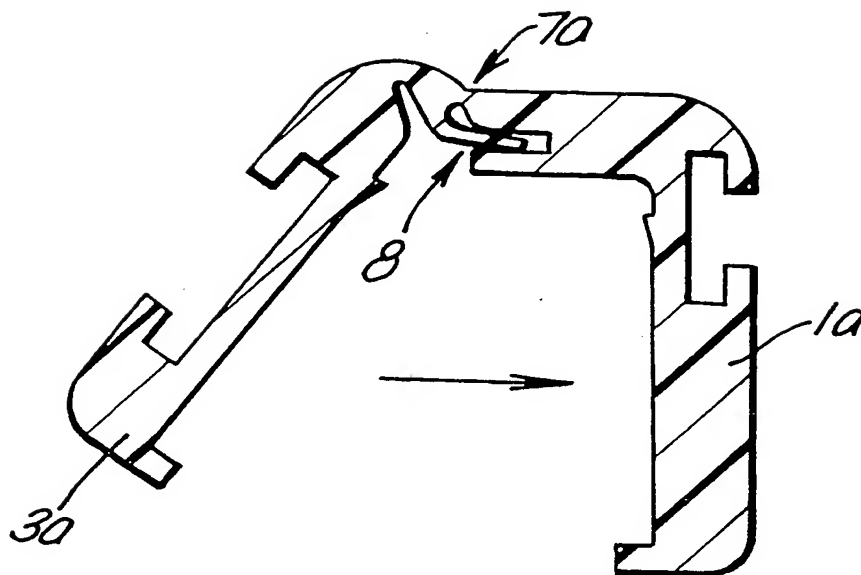


FIG. 4a

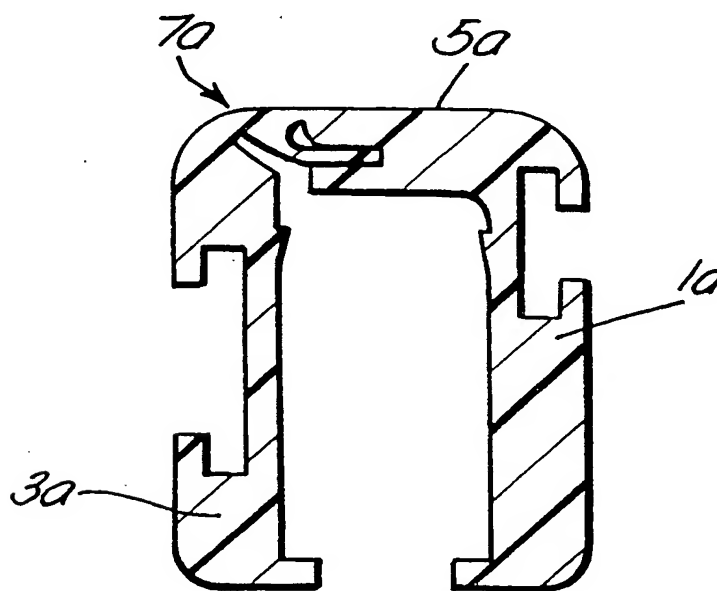


FIG. 4b

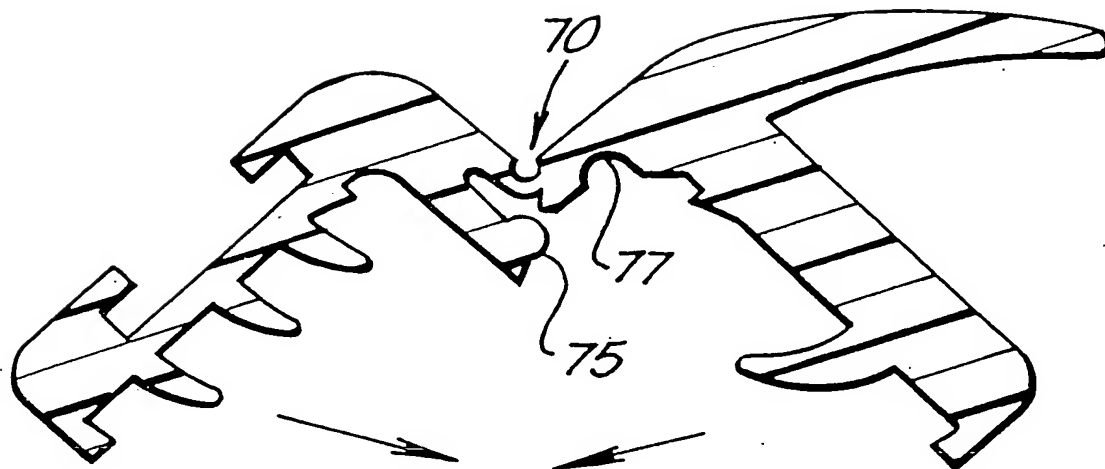


FIG. 5a

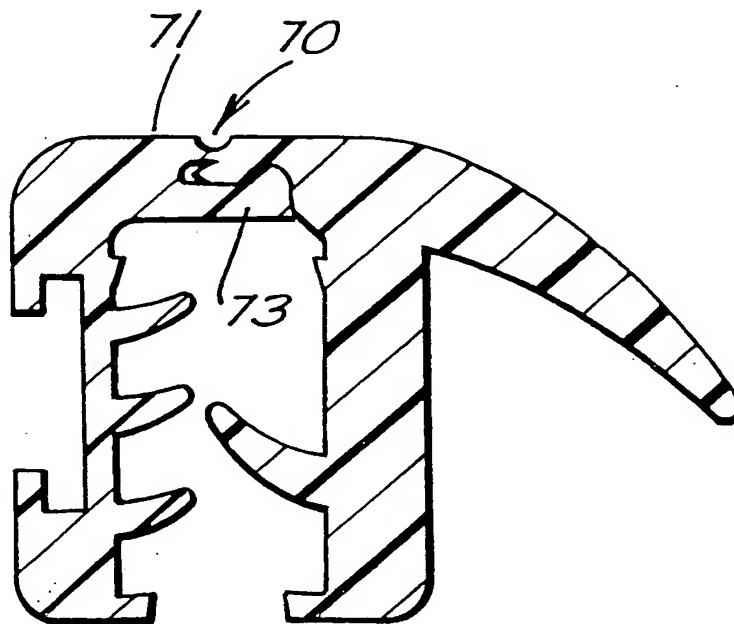


FIG. 5b

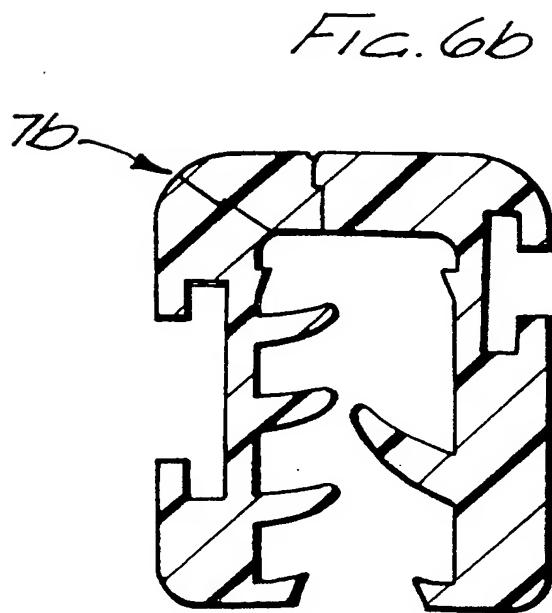
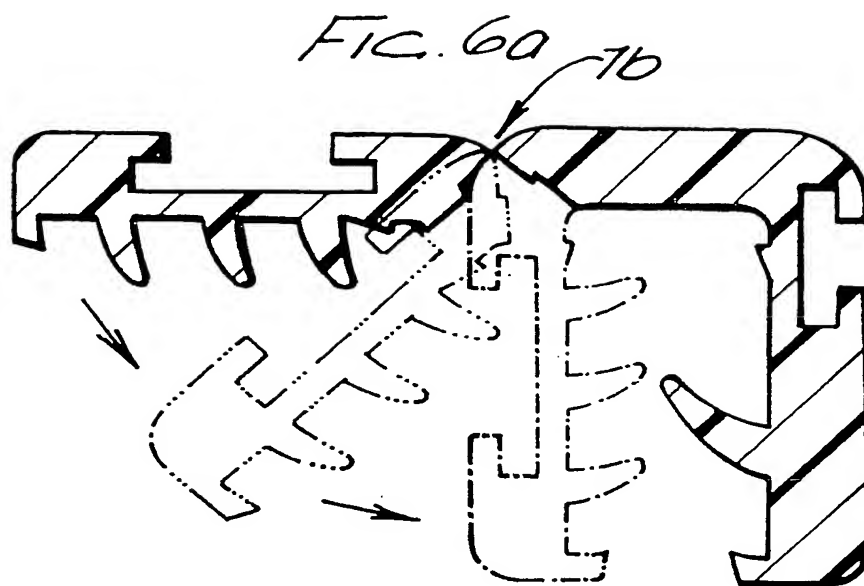


FIG. 7a

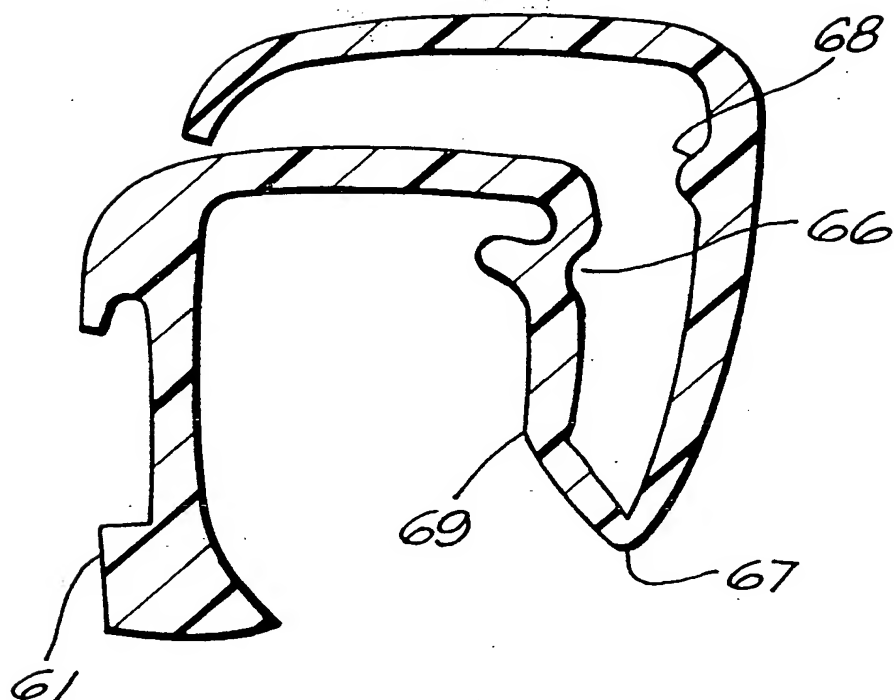
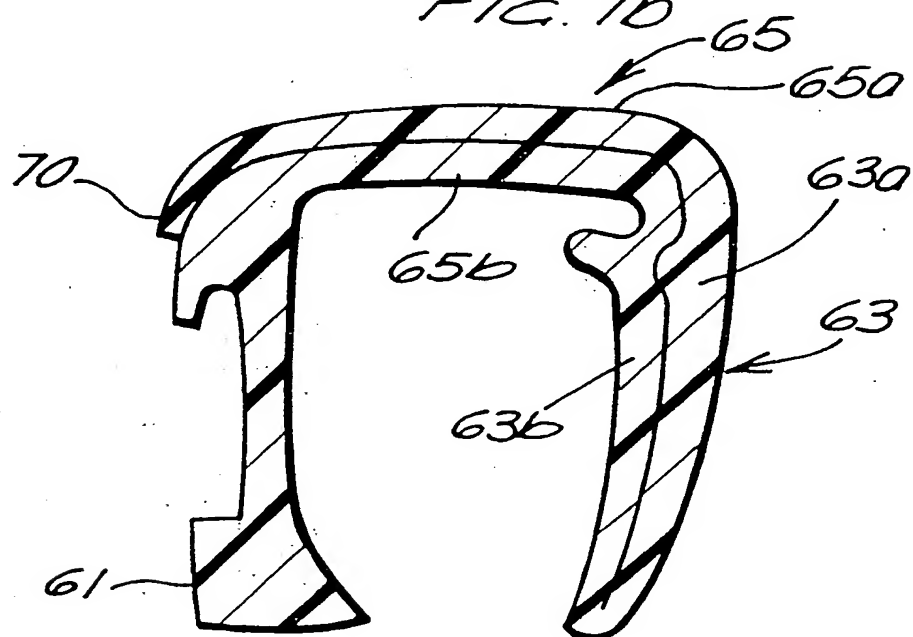


FIG. 7b



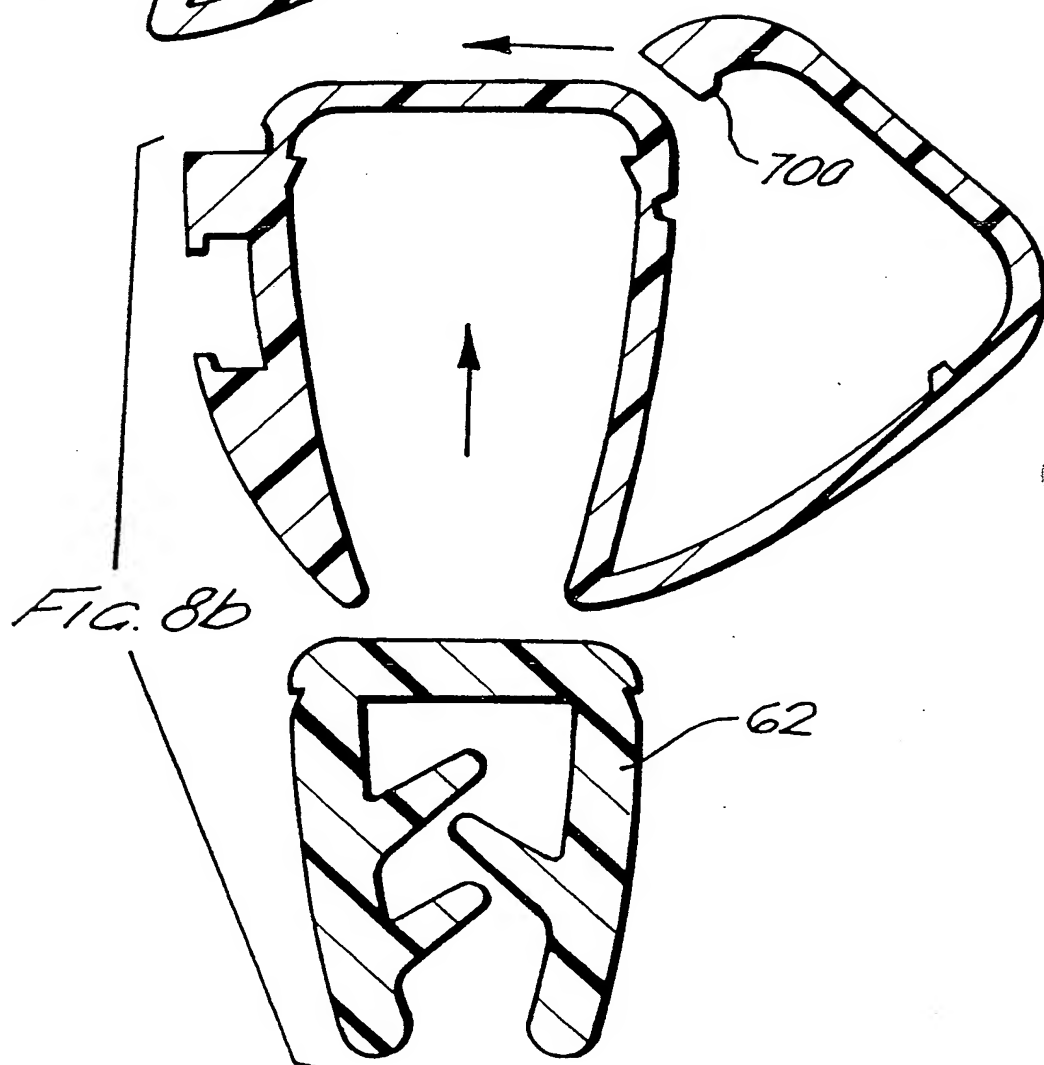
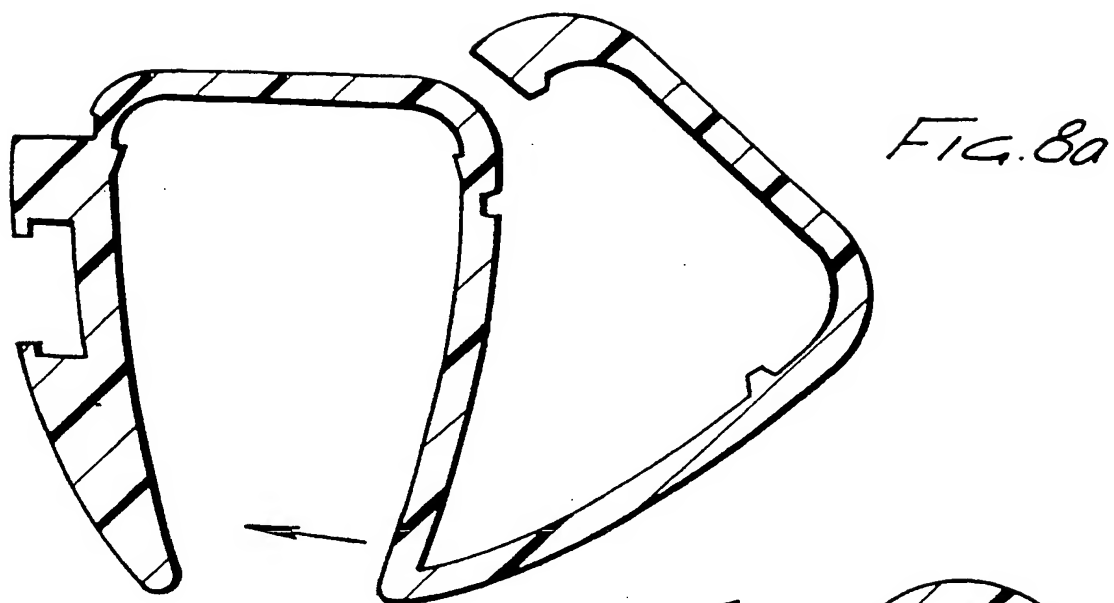




FIG. 8c

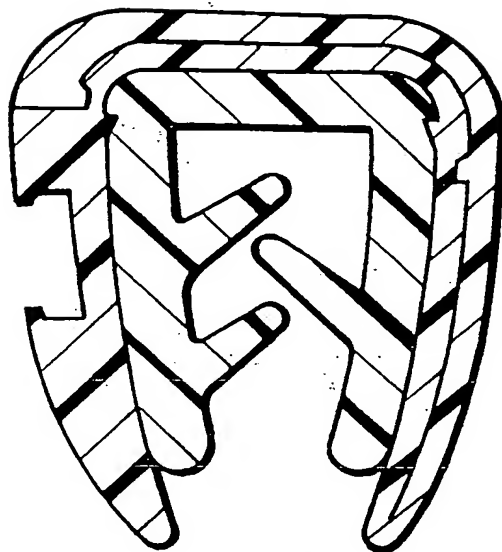


FIG. 10a

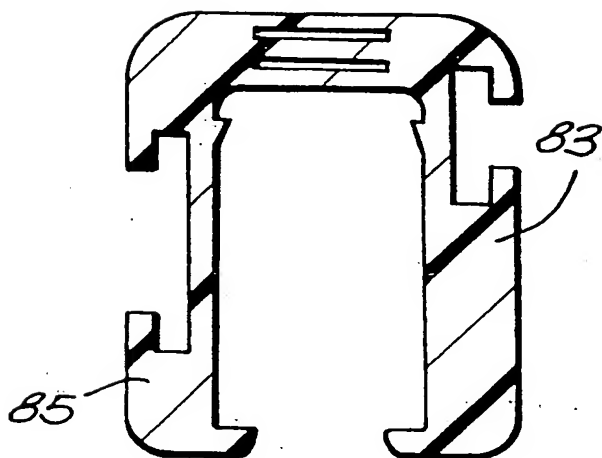


FIG. 10b

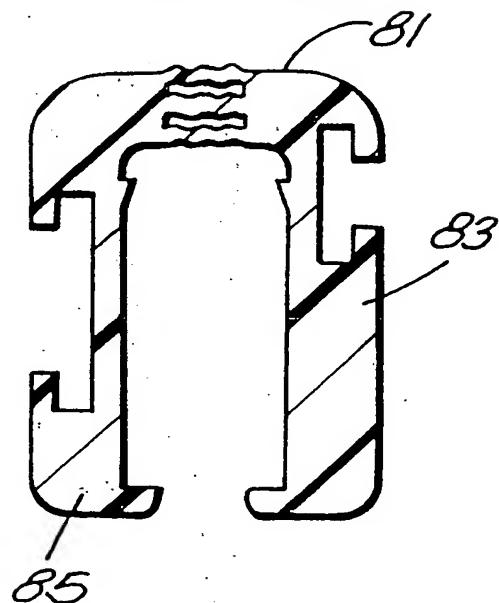


FIG. 9b

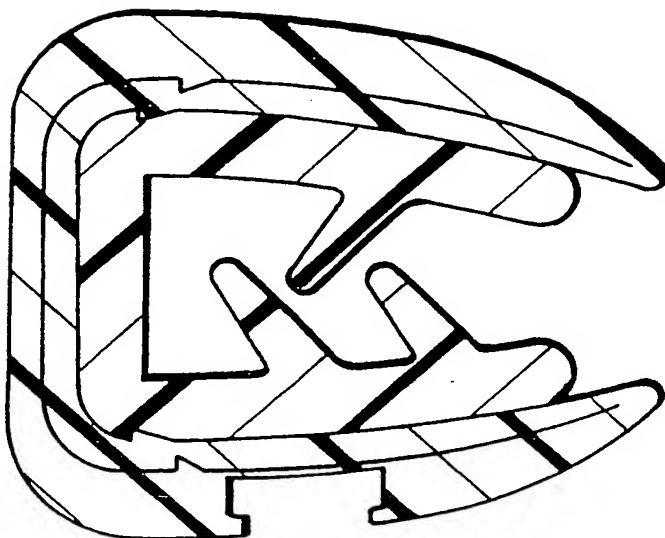
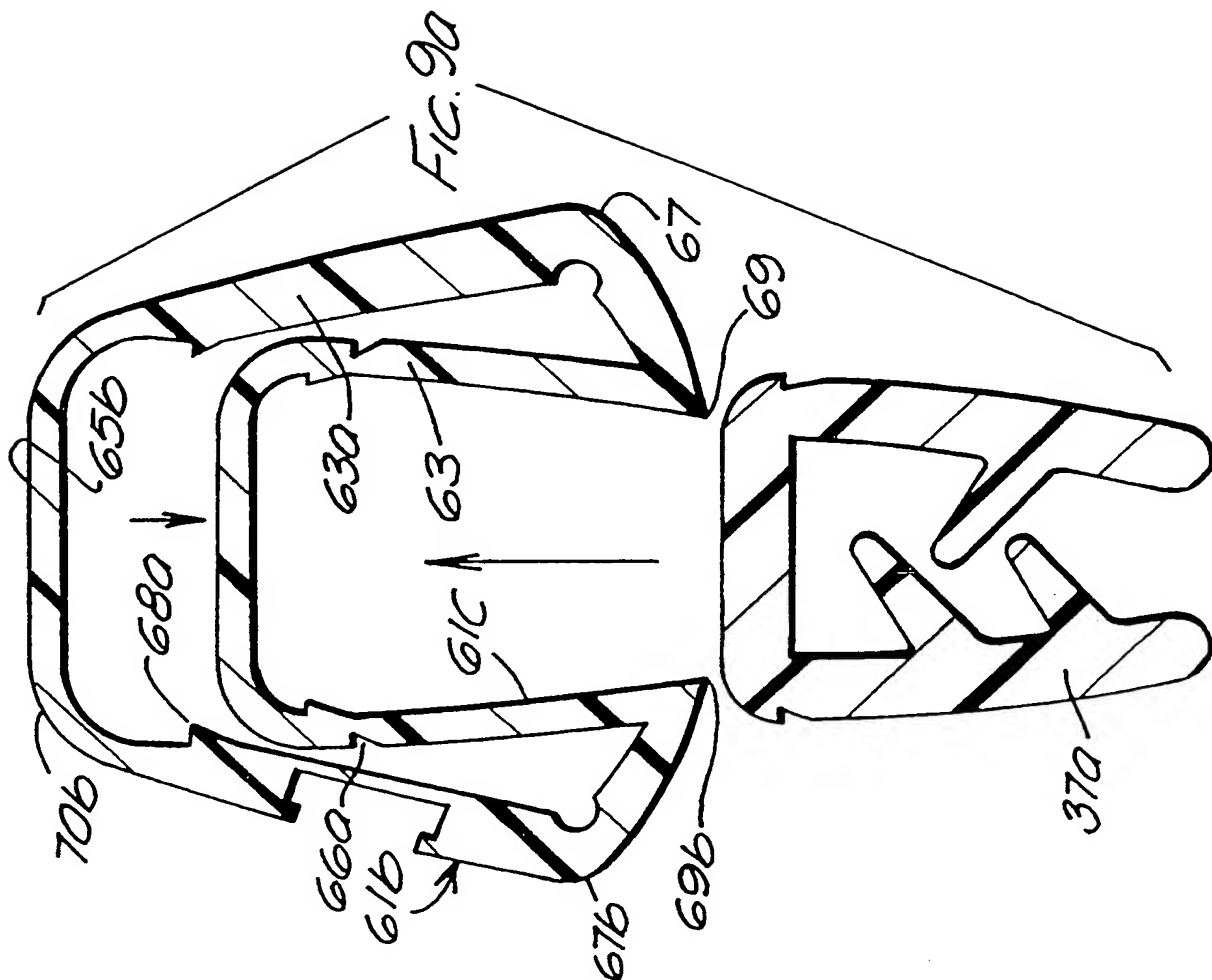


FIG. 9a



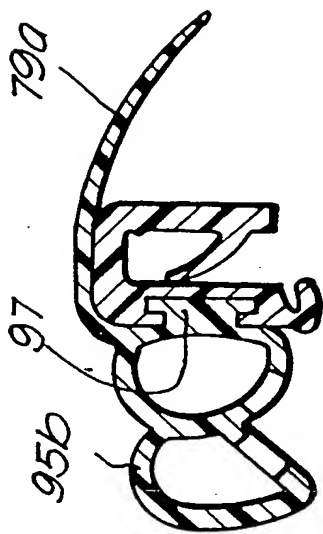


FIG. 11

FIG. 13

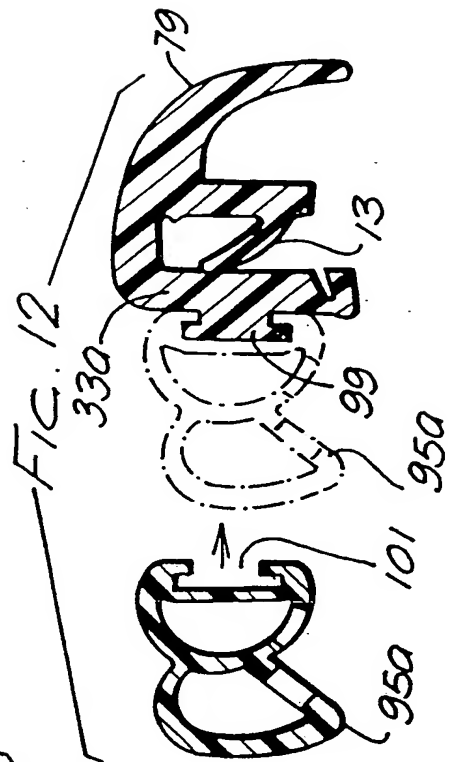
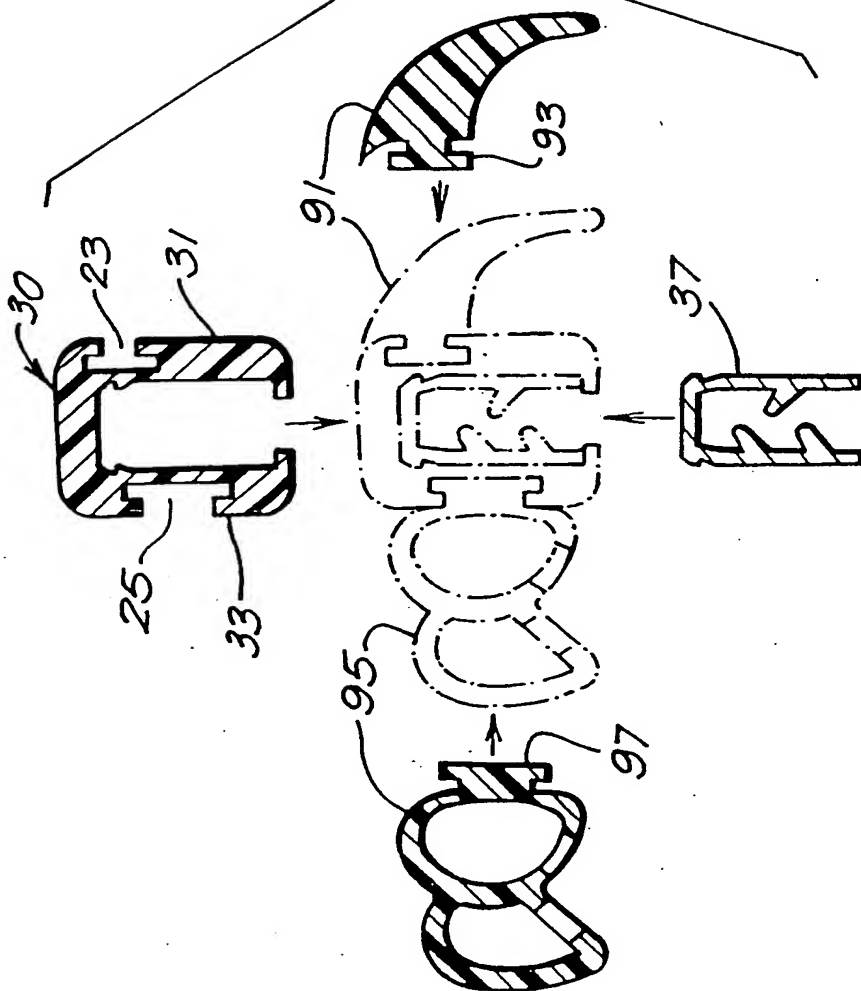
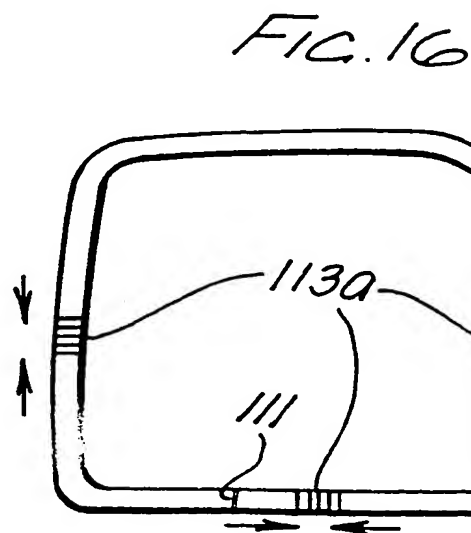
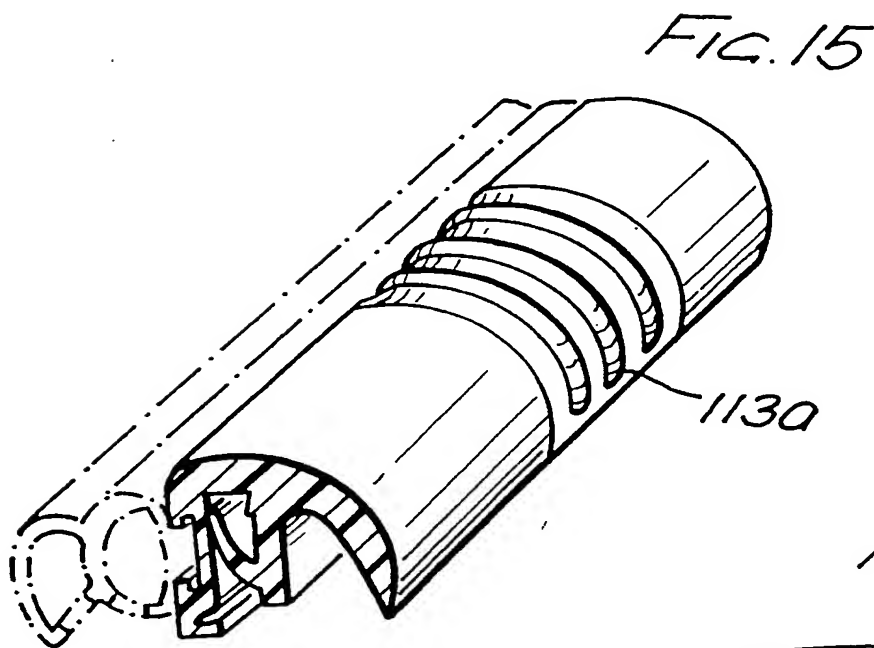
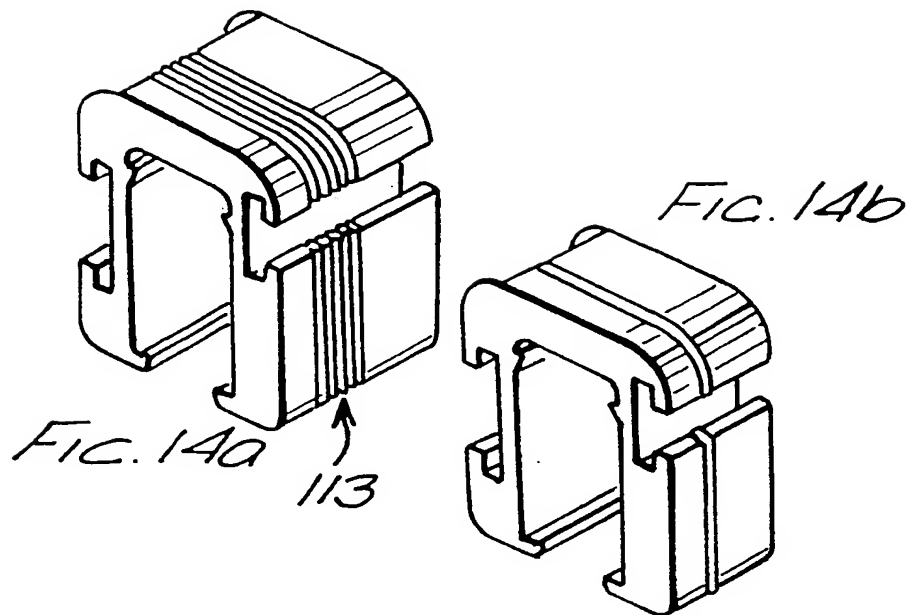


FIG. 12



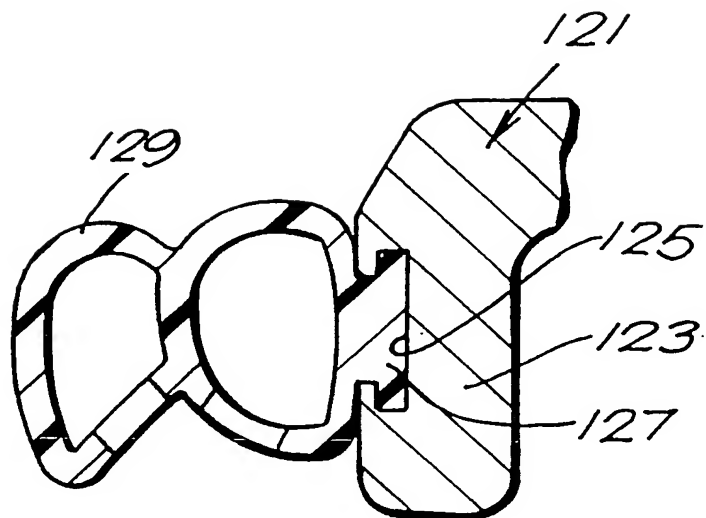


FIG. 17

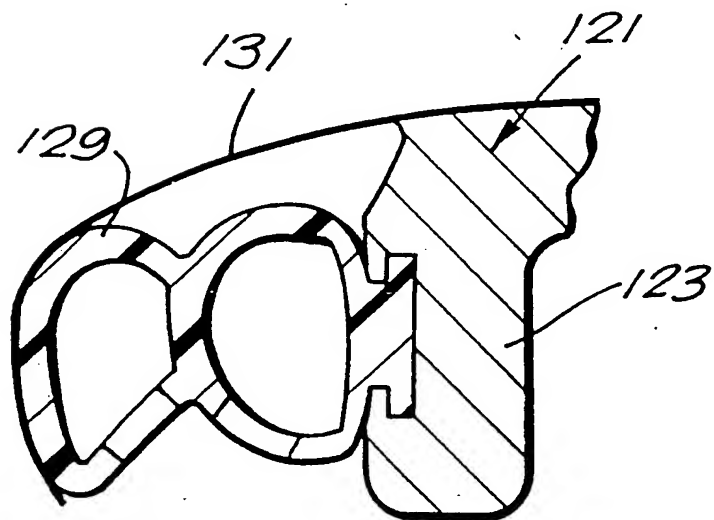


FIG. 17a

## INTERNATIONAL SEARCH REPORT

Inter national Application No

PCT/GB 97/03120

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B60J10/00 B60J10/04

According to International Patent Classification(IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B60J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 628 439 A (GENCORP INC.) 14 December 1994  see the whole document ----	1-3, 15, 17, 18, 30, 31
X	GB 2 177 441 A (BONNINGTON PLASTICS LIMITED) 21 January 1987  see the whole document ----	1-3, 15, 17, 18, 21, 30, 31
X	GB 2 130 277 A (CMC BODIES LIMITED) 31 May 1984  see the whole document ----	1-3, 15, 30, 31
X	US 5 010 689 A (R.A. VAUGHAN) 30 April 1991  see the whole document -----  -/-	4, 29, 32, 33

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

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"E" earlier document but published on or after the international filing date

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Date of the actual completion of the international search

17 February 1998

Date of mailing of the international search report

23/02/1998

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## INTERNATIONAL SEARCH REPORT

Inte      onal Application No  
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 734 896 A (STANDARD PRODUCTS INDUSTRIEL) 2 October 1996 see figures 1-4 ----	8-10, 19, 30, 31
A	FR 2 727 182 A (STANDARD PRODUCTS INDUSTRIEL S.A.) 24 May 1996 see figures 1, 2 ----	4, 29
A	DE 43 39 033 A (METZELER AUTOMOTIVE PROFILES GMBH) 18 May 1995 see figures 1-4 ----	4
A	US 5 343 609 A (M.J. MCMANUS) 6 September 1994 see figures 1-5 ----	4
A	FR 1 353 371 A (GEBR. HAPPICH GMBH) 1 June 1964 see figures 1-6 ----	4
A	EP 0 479 636 A (ETABLISSEMENTS MESNEL S.A.) 8 April 1992 see figures 1-8 ----	4
A	EP 0 295 989 A (AUTOMOBILES PEUGEOT) 21 December 1988 see figures 1-6 ----	5-7
A	EP 0 490 733 A (HUTCHINSON) 17 June 1992 see figures 2-9 ----	5-7
A	FR 2 687 957 A (HUTCHINSON) 3 September 1993 see figures 1, 2 ----	5
A	EP 0 143 421 A (METZELER KAUTSCHUK GMBH) 5 June 1985 see figures 1, 2 -----	5

# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No.

PCT/GB 97/03120

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 628439 A	14-12-94	US 5396733 A CA 2125100 A,C US 5503700 A	14-03-95 10-12-94 02-04-96
GB 2177441 A	21-01-87	NONE	
GB 2130277 A	31-05-84	NONE	
US 5010689 A	30-04-91	CA 2034433 A,C DE 69109718 D DE 69109718 T EP 0448270 A JP 4221224 A	20-09-91 22-06-95 28-09-95 25-09-91 11-08-92
EP 734896 A	02-10-96	FR 2732275 A	04-10-96
FR 2727182 A	24-05-96	NONE	
DE 4339033 A	18-05-95	DE 59402051 D EP 0654371 A ES 2100014 T JP 7195942 A	17-04-97 24-05-95 01-06-97 01-08-95
US 5343609 A	06-09-94	AU 672129 B AU 7298294 A CA 2131271 A DE 69403296 D DE 69403296 T EP 0642943 A JP 7215061 A	19-09-96 30-03-95 16-03-95 26-06-97 28-08-97 15-03-95 15-08-95
FR 1353371 A	01-06-64	DE 1215009 B	
EP 479636 A	08-04-92	FR 2667024 A AT 116913 T CA 2049730 A DE 69106650 D DE 69106650 T ES 2069848 T JP 4257745 A	27-03-92 15-01-95 27-03-92 23-02-95 18-05-95 16-05-95 11-09-92



# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/GB 97/03120

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 479636 A		US 5261206 A	16-11-93
EP 295989 A	21-12-88	FR 2616506 A	16-12-88
EP 490733 A	17-06-92	FR 2670162 A	12-06-92
		DE 69107589 D	30-03-95
		DE 69107589 T	28-09-95
		ES 2068540 T	16-04-95
		US 5319883 A	14-06-94
FR 2687957 A	03-09-93	NONE	
EP 143421 A	05-06-85	DE 3342362 A	05-06-85
		CA 1227232 A	22-09-87
		US 4614061 A	30-09-86

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